ROGGEVELDIA, A NEW GENUS OF SOUTHERN AFRICAN IRIDACEAE-IRIDEAE[1]

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ABSTRACT

Roggeveldia is a new genus recently discovered in the western Karoo, Cape Province, South Africa. Its vegetative morphology, including a cormous rootstock and single leaf is like that of *Moraea* and *Homeria* (Iridoideae-Irideae). Floral characters, anomalous for this alliance, include entirely free stamens and simple terete style branches, features characteristic of Sisyrinchieae, especially the South African *Bobartia*. Floral similarity is probably a result of convergence. Chromosome number in *R. fistulosa* is $n = 6$, which is consistent with numbers in *Moraea* and *Homeria*, but not with Sisyrinchieae.

Roggeveldia is a new genus of African Iridaceae, subfamily Iridoideae. It is probably closely related to *Moraea* and *Homeria* (Irideae-Homeriinae), having a cormous rootstock of a type characteristic of these genera. While *Roggeveldia* conforms to *Moraea* and *Homeria* in its corm, leaf, and general facies, it is remarkable in having long, undivided style branches alternate with the anthers, and free stamens, the filaments not even coherent at their base. Its flower, which also has subequal, outspread tepals, is unique among African Irideae. Of the African genera of Iridaceae-Iridoideae, the flower of *Roggeveldia* is most like *Bobartia*, a rhizomatous genus usually assigned to the predominantly New World Sisyrinchieae, a tribe quite distinct from the Old World Irideae, and one sometimes accorded subfamilial status. Before discussing the relationships and possible origin of *Roggeveldia*, the morphology is described in some detail and the requisite formal taxonomic information presented.

MORPHOLOGY

ROOTSTOCK

The corm is of the single internode type (Lewis, 1954; DeVos, 1977) found in all genera of Homeriinae (Goldblatt, 1976b). The corm, a swollen lateral bud, comprises a single internode with an apical bud primordium and the roots emerge from the bud base on sprouting. The tunics are composed of tough, dark brown reticulate fibers, resembling the type found in several species of *Homeria* and *Moraea*.

LEAVES

A single membranous cataphyll sheaths the base of the leaf, and extends shortly above the ground. In older plants the cataphyll becomes dry and pale brown, but remains intact. The produced leaf is solitary, terete, and hollow. At its apex there is a short, peculiar conical structure found invariably at the leaf

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apices of *Moraea* and *Homeria*, whether terete or bifacial. The leaf is very long at flowering time and usually dry, and broken in the upper half.

STEM

The stem is erect, composed of several internodes, and bears a few branches from the upper nodes. All nodes, with or without branches, bear short sheathing bractlike leaves which are dry and pale, with dark attenuate apices.

INFLORESCENCE

Each inflorescence contains several flowers, which bloom sequentially, a few days apart. The flowers are enclosed by large opposing bracts or spathes, typical of Iridoideae, including Sisyrinchieae, but the outer spathe margins are united in the lower part, a feature known only in genera of Homeriinae.

FLOWERS

The flowers are small, with free, subequal spreading tepals. All six tepals are shortly unguiculate, with the ascending claws forming a shallow central cup. The stamens are straight, slightly inclined and entirely free, with slender filaments. After anthesis the anthers tend to curve inwards from the apex (Fig. 1B). The style is short and filiform and bears three long slender branches which extend outwards between the filaments. Fruits are not known.

CHROMOSOME NUMBER

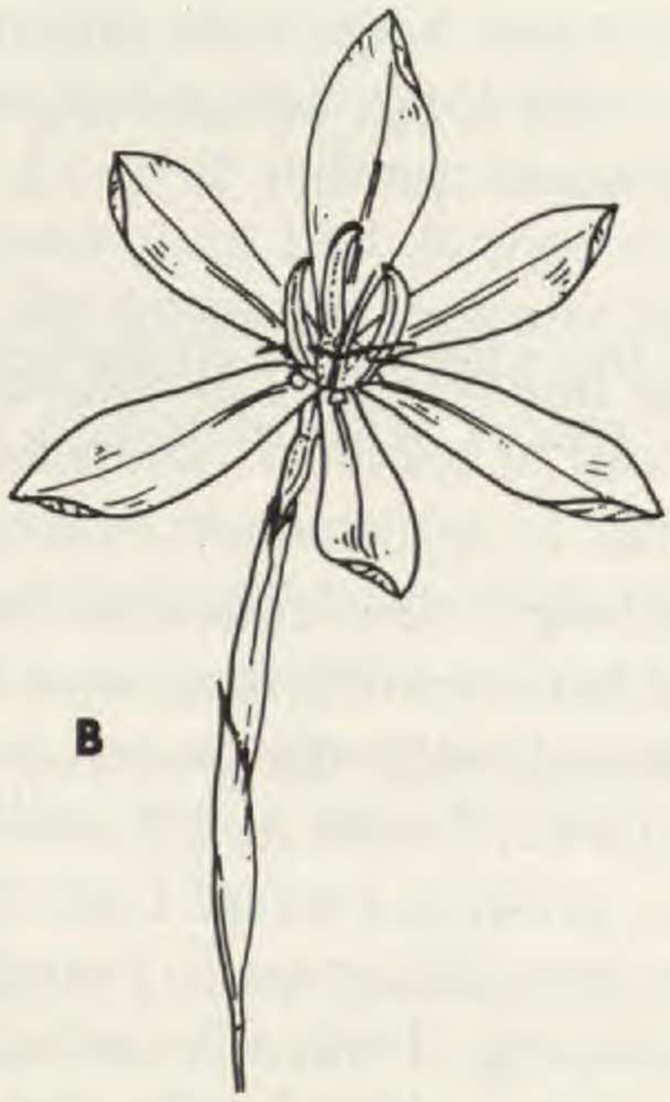
The diploid number is $2n = 12$. The chromosomes are quite large, ranging from 5 to 7μm (Fig. 1C). The largest pair is almost metacentric, and the remaining chromosomes are acrocentric. The next to smallest pair have large satellites, while a pair of longer acrocentrics have an inconspicuous secondary constriction near the end of the longer arm.

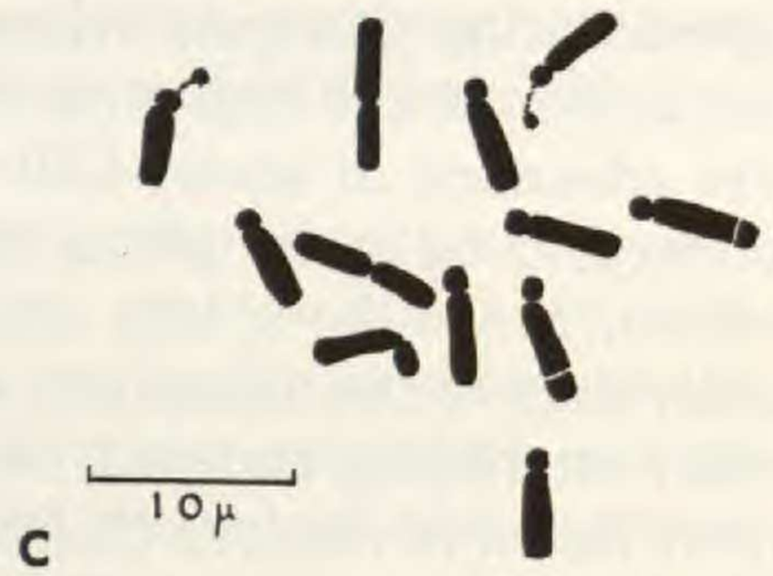
TAXONOMY

Roggeveldia fistulosa Goldblatt, gen. et sp. nov. TYPE: South Africa, Cape, hills near Blomfontein farm between Calvinia and Middelpos, *Goldblatt 4163* (MO, holotype; K, NBG, isotypes).—FIG. 1.

Planta solitaria, 30–50 cm alta. Cormus 1–1.5 cm in diametro, tunicis fibris atrobrunneis. Folium unum, teres, fistulosum, caulis excedentis. Caulis erectus, nodis bracteas attenuatas ferentibus, ramosus. Spatha 3–3.5 cm longa. Flores stellati, fugacei, caerulei, luteo-aurantiacis notatis; tepala subaequalia 1.6–1.8 mm longa, unguis 2 mm longis. Filamenta libera, 4 mm longa; antherae ca 4.5 mm longae, erectae, sed post anthesis incurvatae. Rami styli filiformes, indivisi, antheris alternati, inter filamenta extensi.

Plants solitary, 30–50 cm high. Corm 1–1.5 cm in diameter with tunics of dark brown, wiry fibers. Cataphyll dry to membranous, entire. Leaf solitary, terete, hollow, usually straight, to 3 mm in diameter and longer than the stem. Stem 30–50 cm high, erect, bearing bracts at the nodes, and branching in the upper part; bracts 2.5–3.5 cm long, dry, pale below and with a dark attenuate apex. Spathes





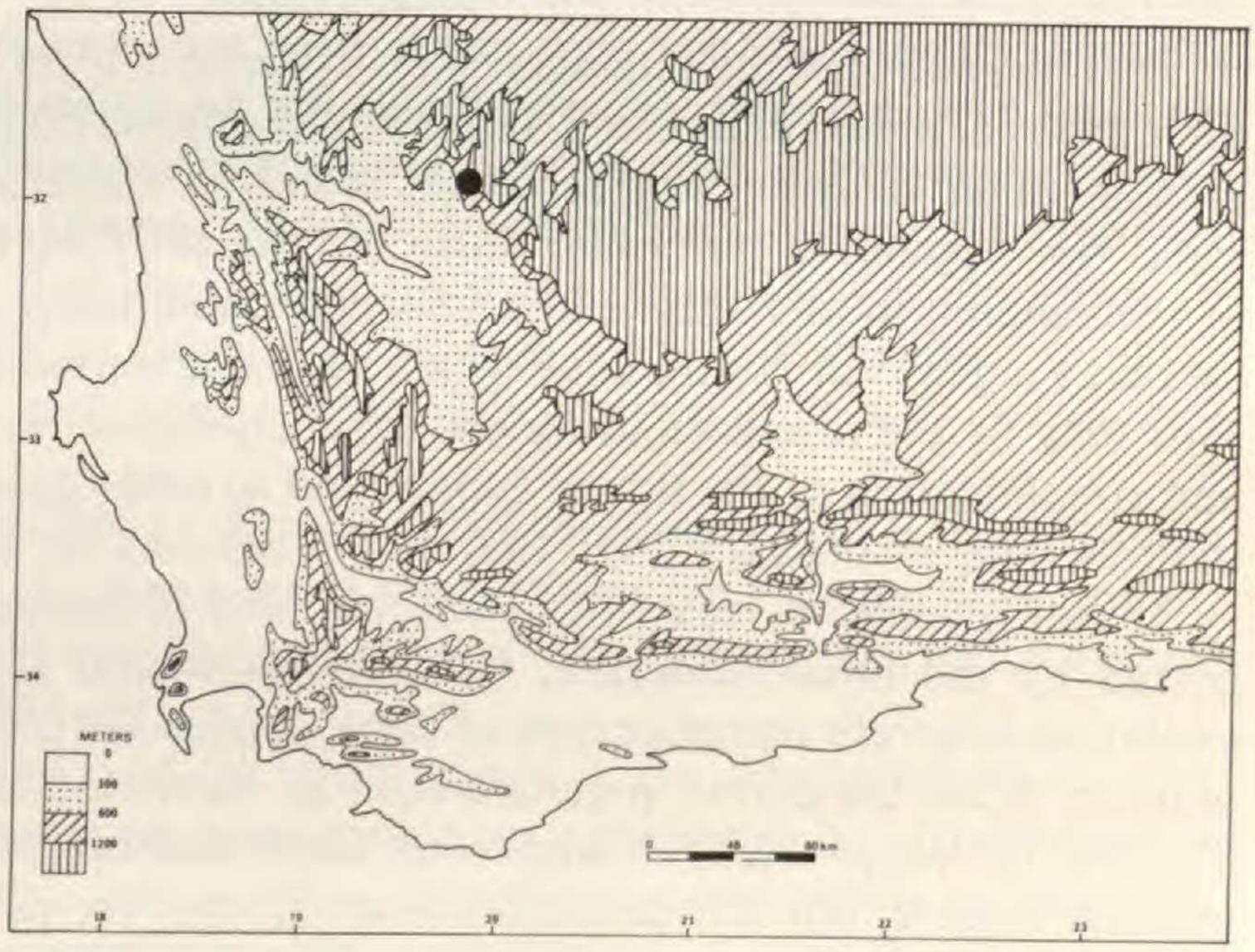


FIGURE 1. Morphology and distribution of *Roggeveldia fistulosa*.—*A*. Habit, ×½.—B. Flower, life size.—C. Mitotic metaphase.

3–3.5 cm long, the outer ca. ⅔ as long as the inner, herbaceous or drying from above, the apex dark brown and attenuate. Flowers stellate, fugaceous, lasting from 4:00–7:00 P.M.; blue with yellow orange nectar guides at the base of the tepal limb; tepals subequal, 1.6–1.8 cm long, the inner whorl slightly smaller, unguiculate, the claw 2 mm long, ascending, the limb outspread. Filaments ca. 4 mm long, free to the base; anthers ca. 4.5 mm, straight in bud, becoming

incurved after anthesis. Ovary ca. 3 mm long; style filiform, 2.5–3 mm long, the branches only 3, slender, ca. 2.5 mm long, outspread, extending between the filaments. Fruit unknown. Chromosome number $2n = 12$.

Flowering time: December.

Distribution: known only from the edge of the Roggeveld escarpment between Calvinia and Middelpos in rocky places with mountain renosterbos vegetation (Fig. 1).

This species was, to my knowledge, first collected in 1976, when I found it while collecting in the Roggeveld between Calvinia and Middelpos. It was first noted during October, when I found only the peculiar leaves. Much later in December, at the beginning of summer, I collected flowering stems, which in the late afternoon at about 4:30 P.M., produced small blue flowers. Although there seemed to be many plants in the immediate area, I could locate only a few in bloom, hence the scanty type gathering. I have found no trace of *Roggeveldia* other than in the immediate area of the original collection, a place around which other interesting endemic Iridaceae have been discovered (Goldblatt, 1979), notably *Babiana virginea* Goldbl., *Ixia thomasiae* Goldbl., and outlying populations of *Moraea unguiculata* Ker and *Hexaglottis lewisiana* Goldbl.

DISCUSSION

Roggeveldia has the characteristics of genera from two apparently quite distinct tribes or even subfamilies. It has flowers most resembling *Bobartia*, regarded as a member of tribe Sisyrinchieae, which is sometimes accorded subfamilial rank, but vegetative parts like those of Irideae-Homeriinae. *Roggeveldia* is not in my opinion in any way a link between these tribes, but seems to me almost certainly a genus of Homeriinae which has an apparently primitive type of flower. This may be the retention of an ancestral character, or, more likely, a reduction and simplification of the flower type found in other genera of this assemblage. In the following discussion I will outline my reasons for this conclusion.

If *Roggeveldia* is related to *Bobartia* (and presumably Sisyrinchieae) as suggested by the floral structure, then one is forced to assume the independent evolution of a very complex type of corm similar not only in general, but matching in every detail the corms in genera such as *Moraea* and *Homeria* of Homeriinae. The leaf of *Roggeveldia* is somewhat specialized in being terete and hollow, an unusual feature, but it is deciduous and also has the peculiar apical appendage as found in other Homeriinae, whereas all *Bobartia* species are evergreen, and their leaves, whether terete or flat, have no modified apex. The jointed and branched stem, with sheathing attenuate bracts are typical of Homeriinae and unlike *Bobartia*, in which the only two branched species, *B. lilacina* Lewis and *B. gladiata* Lewis, both have green obtuse bracts subtending branches. Unbranched species of *Bobartia* have stems of a single internode and thus lack stem bracts.

Cytologically, *Roggeveldia*, $n = 6$, accords well with Homeriinae, where, although a base number of $x = 10$ is believed to be ancestral (Goldblatt, 1976a), $n = 6$ predominates in *Moraea* and is basic in *Homeria* and *Hexaglottis*. *Bobartia* in contrast has $n = 10$ (Goldblatt, 1971; Strid, 1974). The karyotype of *Roggeveldia* matches best those of *Moraea* section *Polyanthes*, species of which

have $n = 6$ and a karyotype of either 6 acrocentric pairs or 5 acrocentrics and one submetacentric. *Homeria* species with $x = 6$ have all the chromosomes strongly acrocentric.

Assuming that my contention that *Roggeveldia* is a true member of Homeriinae is correct, one of the following logically follows. Either the *Bobartia*-type flower evolved independently in *Roggeveldia* or it is a primitive feature of ancestral, now extinct Homeriinae, retained in this genus alone. In order to explore this it is necessary to analyze the patterns of variation in *Moraea*, *Homeria*, and their allies. I have suggested (Goldblatt, 1976b) that *Moraea*, the least specialized genus of Homeriinae was derived from a *Dietes*-like ancestor (Irideae-Iridinae). *Dietes* is evergreen, and has equitant large leaves, a thick persistent rhizome and a flower with spreading tepals, usually free stamens and large petaloid style branches with forked crests. The base number is $x = 10$.

In *Moraea*, a large genus of some 100 species, and other genera of the subtribe, the rootstock is a corm, the plants are deciduous, and the leaf is typically bifacial and channeled, but occasionally terete. *Moraea* is distinguished in the subtribe by its flattened petaloid style branches with transverse styles and dimorphic tepal whorls. Highly ramified and multileafed species of *Moraea* have unspecialized flowers, are presumably primitive, and have a base number of $x = 10$ (or 9) (Goldblatt, 1976a). Specialized species have only a single leaf, reduced branching, and mostly $x = 6$. Among this group are some species with narrow style branches and very short or vestigial crests, and subequal tepals, features which accord with characteristics of the related genera *Homeria* and *Rheome* (Goldblatt, in prep.). Other species of *Homeria* have slender style branches which appear to be derived from *Moraea* directly, by reduction and simplification of certain floral features, and it is likely that this trend occurred in several lines in *Moraea*, giving rise to several species of *Moraea* section *Polyanthes*, notably *M. crispa*, *M. alba* and *M. polyanthos* (Goldblatt, in prep.), as well as *Homeria* and *Rheome*.

One other genus is relevant to this discussion, *Hexaglottis*, a small genus much resembling *Homeria*. In *Hexaglottis* the stamens are only partially united, while style branches are each deeply divided into two long branches which extend horizontally between the filaments.

The point of this exposition of the morphology in the *Moraea-Homeria* alliance is that the general evolutionary pattern here appears to be of reduction of several independent features: leaf number, branching, tepal whorl dimorphism, and style branch size and complexity. The style branches vary from broad, petaloid, and crested to narrow and linear with reduced crests and ultimately to a filamentous state either with forked apices (*Homeria* or *Rheome*) or forked to the base (*Hexaglottis*). The style branch reduction usually is accompanied by decreasing differences between inner and outer tepal whorls.

Roggeveldia can, in the reduction pattern described above, be easily interpreted as a plant in which one further step in this progression has occurred. It resembles most closely *Moraea crispa*, and compared to this species, the processes required to produce the *Roggeveldia* flower may be outlined as follows. First, the filaments, which range in *M. crispa* from free near the apex only, to free for two-thirds their length, become entirely separate. Second, the narrow

but flattened style branches of *M. crispa* which lie along the anthers and are bilobed apically would lose their flattness and slight terminal lobing, becoming terete and filiform. Third, the style arms, no longer flat, would lose their position lying against the anthers, and by twisting through some 30–60 degrees, come to lie in the space between each anther. *Moraea crispa* is so similar in other respects that it can barely be distinguished from *Roggeveldia*.

There seems little doubt that *Roggeveldia fistulosa* merits generic recognition as it has characteristics of several different genera in unique combination. It cannot be assigned to an existing genus without major, and to my mind, unnecessary redefinition of the African members of Iridoideae. Despite its very simple and apparently primitive flower, the interpretation of available evidence makes it reasonable to assume that it was derived from species like *Moraea crispa* of *Moraea* subgenus *Vieusseuxia* by an evolutionary process of reduction of complex floral parts. Vegetative morphology and cytology entirely accord with this hypothetical phylogeny. Floral similarities between *Roggeveldia* and *Bobartia*, however striking, are believed to be due to convergence.

POSTSCRIPT ON BOBARTIA

Bobartia, a small genus of some 15 species (Strid, 1974) is generally regarded as a member of tribe Sisyrinchieae (or Sisyrinchioideae). The tribe comprises mainly New World and Australasian genera, *Bobartia* being the only African member. Placement of *Bobartia* here seems anomalous on phytogeographic grounds and, with the exception of its unspecialized flower, *Bobartia* does not conform well with other genera of Sisyrinchieae. The discovery of just this type of flower in *Roggeveldia*, almost certainly a very specialized genus of Irideae, makes it reasonable to question the apparent primitiveness of the *Bobartia* flower and hence the systematic position of this genus. It seems at least possible that *Bobartia* may have been derived from African relatives of Irideae with more complex flowers in the same way that the *Roggeveldia* flower is presumed to have evolved. The genus *Dietes*, which has a similar thick woody rhizome, evergreen leaves, and a basic chromosome number of $n = 10$, the same number as in *Bobartia*, should be considered in particular, as possibly close to the ancestral type for *Bobartia*.

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